



Fall Chinook Salmon Site Specific Criteria

Idaho Board of Environmental Quality
November 10, 2011

Outline

- History
- SSC Proposal
- Overview of Fall Chinook salmon status
- Overview of Current Science Supporting SSC
- Regional comparison of fall Chinook salmon spawning
- Addressing Other Comments on the Proposal
- Scientific Peer Review
- Conclusion

History

- 2006 – proposal for SSC to IDEQ; ODEQ participated as an Observer
- 2006 Proposal:
 - *Fall Chinook salmon criteria not greater than 16.5 C as a daily maximum temperature on October 23 and subsequent daily maximum temperatures not to exceed levels equal to 0.2 C daily rate of decline through Nov 10. From Nov 11 through April 15, the daily maximum temperature was not to exceed 13 C. Applied from HC Dam to the Oregon Washington Border (RM 176.1).*

History

- IDEQ held meeting to discuss Technical Merits
 - The 16.5°C is “protective of Snake River fall Chinook salmon” - would be beneficial relative to the existing 13°C - NOAA
 - Temperatures above 13°C appear warranted – recommended no higher than 16°C because of bull trout – USFWS
 - 16.5°C did not provide a sufficient “buffer” – ODFW, IDFG
 - 14.5-15.0°C – should be the “outer boundary” and even if 15.5 was protective it did not mean the temperature criterion should be set there. – NPT
 - Agreed that spawning thresholds above 13°C were demonstrated in the literature, but argued that the 16.5°C was insufficiently protective – CRITFC
 - General concerns from outside commenters:
 - No inherent added protection for a Threatened Species under ESA
 - Potential increases in temperature downstream from the compliance point
 - Accuracy of temperature equipment
 - Needed an explicit margin of safety – proposal was at the “edge of the envelope”.
- 2010 Proposal addressed these concerns – modified proposal with lower temperature at initiation of spawning

Idaho Definition

- **Weekly Maximum Temperature (WMT)** - the WMT is the mean of daily maximum temperatures measured over a consecutive seven (7) day period ending on the day of calculation.

Maximum Weekly Maximum Temperature - (MWMT) the single highest weekly maximum temperature (WMT) that occurs during a given year or other period of interest, e.g., a spawning period. When used seasonally, e.g., spawning periods, *the first applicable WMT occurs on the seventh day into the time period.* IDAPA 58.01.02.52.

SSC Proposal

Existing:

286.SNAKE RIVER, SUBSECTION 130.01, HUC 17060101, UNIT S1, S2, AND S3; SITE-SPECIFIC CRITERIA FOR WATER TEMPERATURE.

A maximum weekly maximum temperature of thirteen degrees C (13C) to protect fall chinook spawning and incubation applies from October 23rd through April 15th in the Snake River from Hell's Canyon Dam to the Salmon River.

Oct 23	Oct 24	Oct 25	Oct 26	Oct 27	Oct 28	Oct 29
						13.0 C
Oct 30	Oct 31	Nov 1	Nov 2	Nov 3	Nov 4	Nov 5
13.0 C	13.0 C	13.0 C	13.0 C	13.0 C	13.0C	13.0 C
Nov 6	Nov 7	Nov 8	Nov 9	Nov10	Nov11	Nov12
13.0 C	13.0 C	13.0 C	13.0 C	13.0 C	13.0C	13.0 C

MWMT
(Existing Criteria)

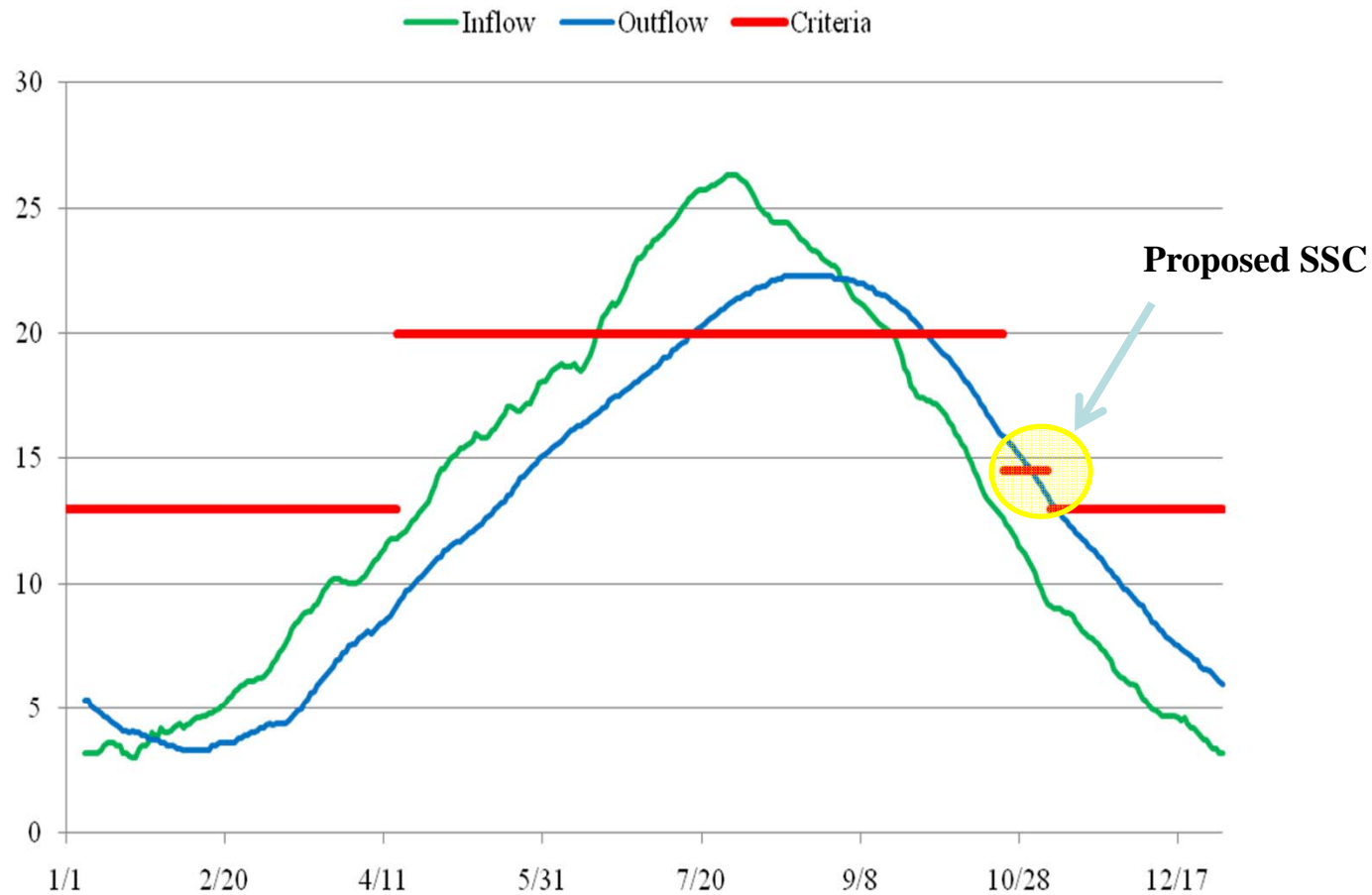
Proposed Rule:

A weekly maximum temperature (WMT) of 14.5C from Oct 23rd through November 6th and WMT of 13C from November 7th through April 15th. The first date a WMT can be calculated is October 29th to protect fall Chinook spawning and incubation in the Snake River from Hell's Canyon Dam to the Salmon River.

Oct 23	Oct 24	Oct 25	Oct 26	Oct 27	Oct 28	Oct 29
						14.5 C
Oct 30	Oct 31	Nov 1	Nov 2	Nov 3	Nov 4	Nov 5
14.5 C	14.5 C	14.5 C	14.5 C	14.5 C	14.5 C	14.5 C
Nov 6	Nov 7	Nov 8	Nov 9	Nov10	Nov11	Nov12
14.5 C	13.0 C	13.0 C	13.0 C	13.0 C	13.0C	13.0 C

WMT
(Proposed Criteria)

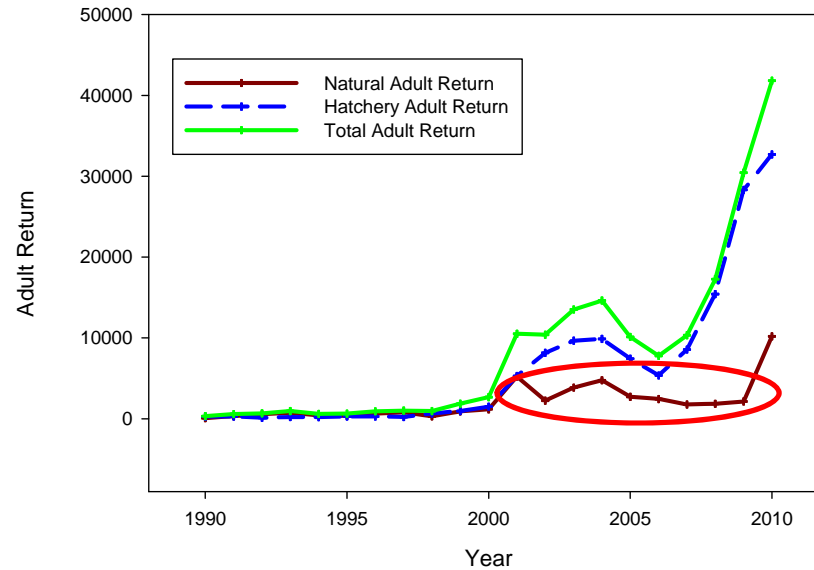
Graphical Representation of SSC



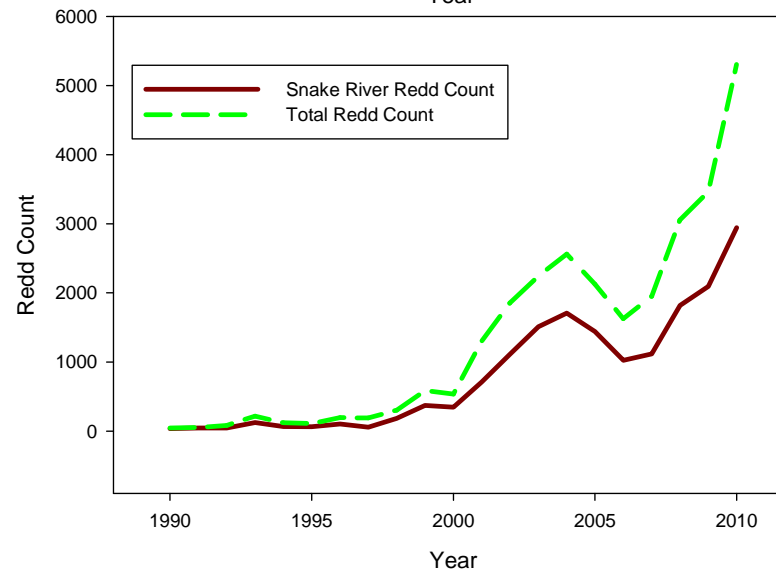
Appropriate Start Date for SSC

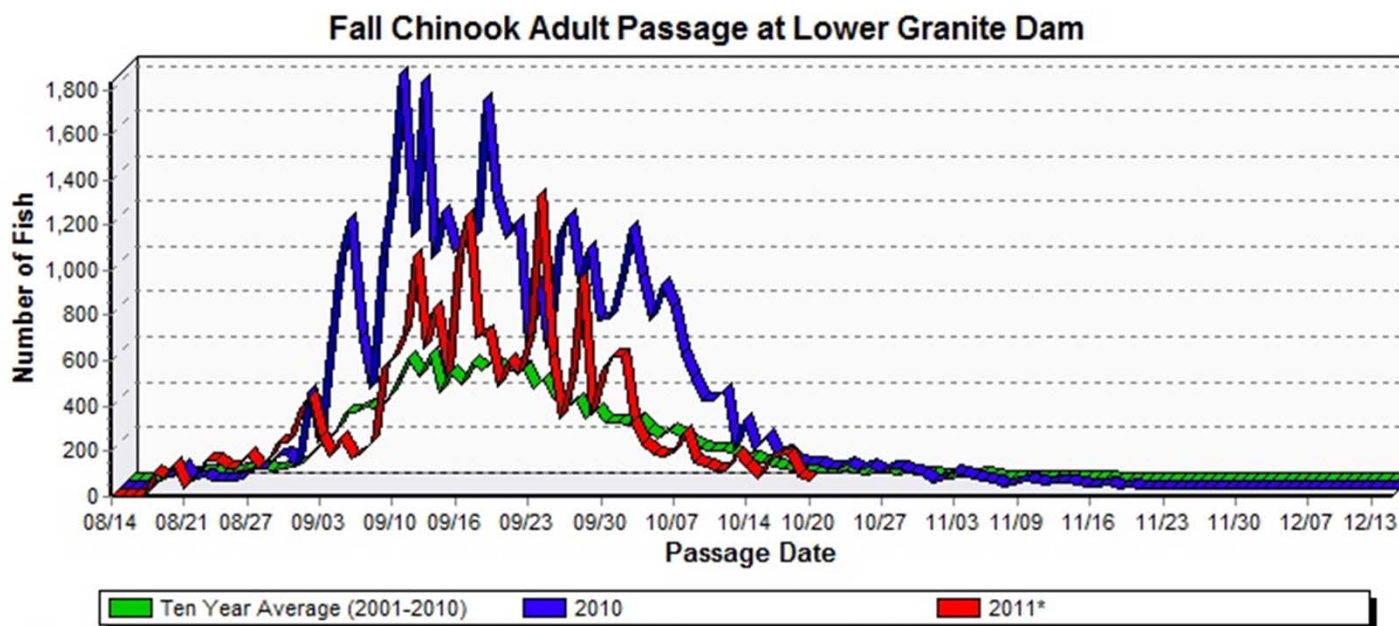
- EPA Region 10 Guidance:
 - ...recommends that this use [the protection of water bodies used or potentially used for salmon and trout spawning, egg incubation, and fry emergence] apply from the average date that spawning begins to the average date incubation ends
- Both the current criteria and the proposed criteria follow this guidance.
- IDEQ and ODEQ concluded in the Snake River-Hells Canyon TMDL that October 23 was the most appropriate start date – EPA approved 2004
- The average initial observation of redds between HC Dam and the confluence with the Salmon River for the past 20 years is October 23 (1990-2010). IPC is not proposing a change to the start date.

The Beneficial Use - SR Fall Chinook Salmon



*Estimated from run-reconstruction.
Methods being re-evaluated.
HGMP Addendum - 2011*





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Graph design last updated on 07/15/10

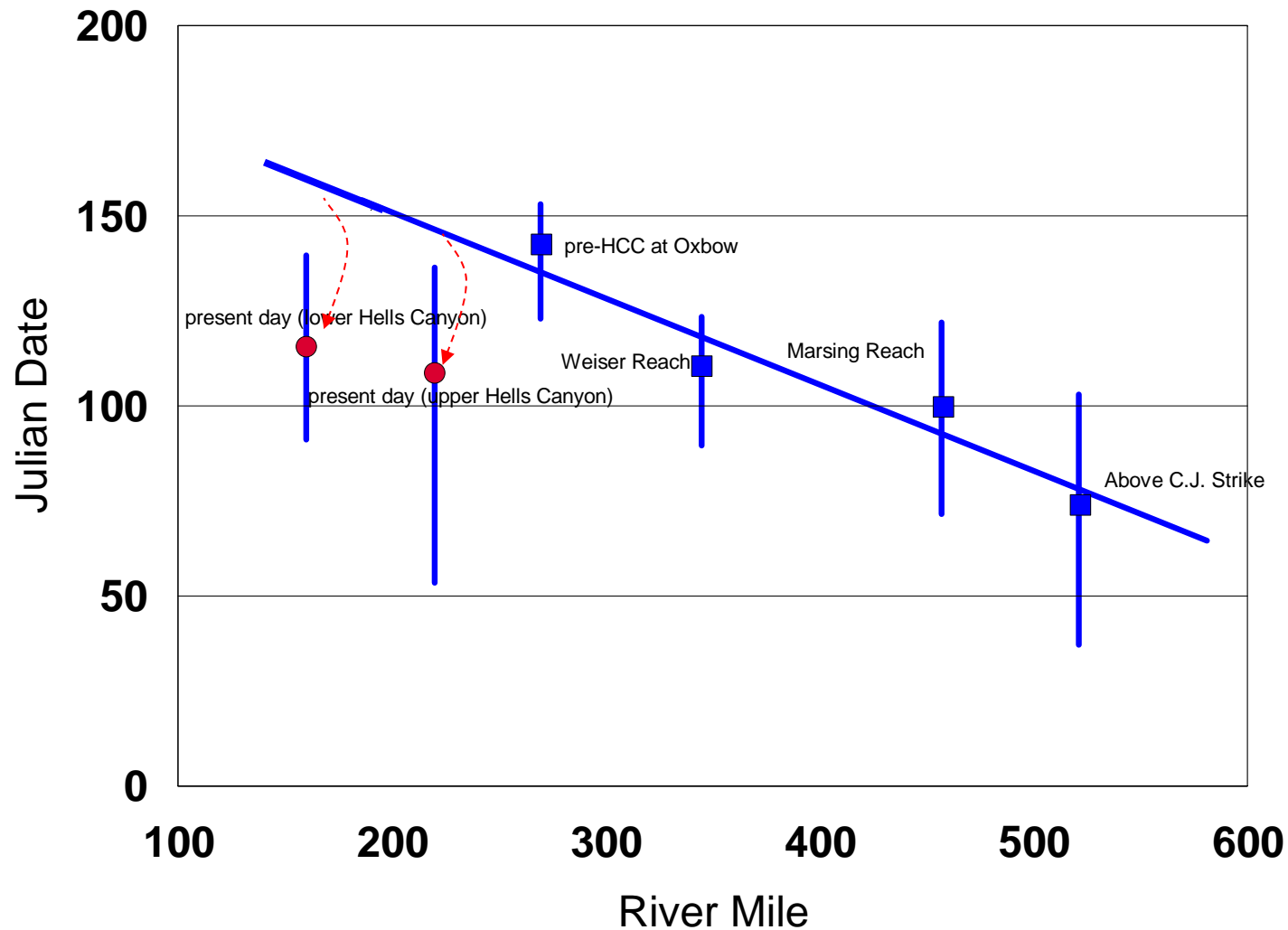
**YTD for 2011 ~ 25,000 adults
~ 19,000 jacks**

SR - Fall Chinook Salmon

- Fall Chinook salmon spawn in periods of declining water temperatures
- Fall Chinook salmon spawn in large mainstem environments / prone to warmer thermal regimes.
- Typical life history is Age-0 – rearing in fresh water for only a brief period
- These habitat and life history characteristics suggest that fall Chinook salmon cannot be compared to other races of Chinook salmon or other species of Pacific salmon
- Snake River fall Chinook salmon juveniles demonstrate very high growth rate as juveniles
- Fall Chinook salmon require conditions that promote early emergence to maintain an Age-0 life history. Early emergence promotes higher survival.
- Thermal conditions present below Hells Canyon today promote the Age-0 life history.

Emergence Dates and Age-0 Life History

Emergence Dates



Regional Comparisons

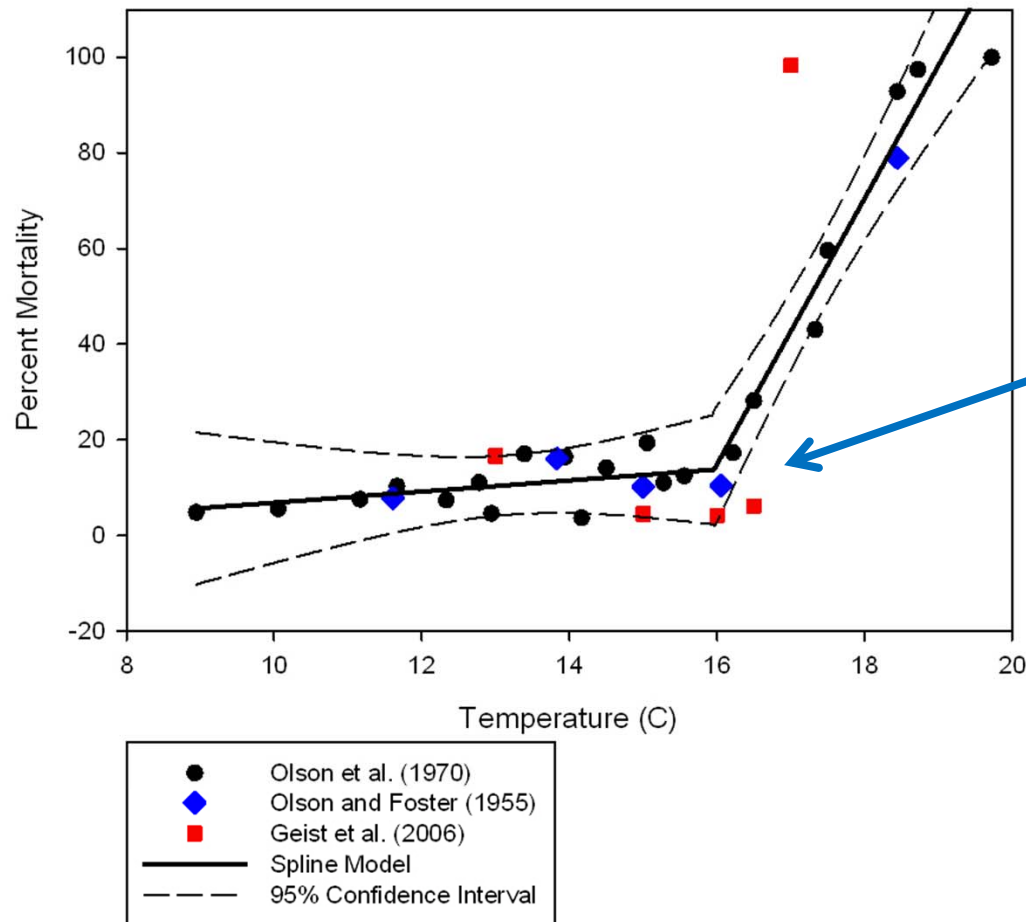
- Initial spawning at temperature $\leq 16^{\circ}\text{C}$ is common for fall Chinook salmon, even in systems other than the Snake River (Hanford Reach, Lower Columbia River, Klamath River)
- Maximum Weekly Maximum Temperatures (on Oct 29th) for Hanford Reach (Priest Rapids Tailrace) v. Upper Hells Canyon and Lower Hells Canyon Reach

Year	Priest Rapids Tailrace	Hells Canyon Dam	RM 192.3	RM 165.7
2006	15.0	15.3	15	12.8
2008	14.3	14.9	14.8	12.6
2009	14.2	14.8	14.4	12.3

Supporting Science

- Three specific studies to fall Chinook salmon initial incubation temperatures:
 - Geist et al. (2006) – SR fall Chinook salmon
 - Olson et al. (1970) – Hanford Reach fall Chinook salmon
 - Olson and Foster (1955) – Hanford Reach fall Chinook salmon
- All recognized a declining thermal regime
- All three studies indicated a sharp increase in mortality when a threshold temperature during incubation was exceeded.
 - Geist et al. (2006) reported a temperature threshold value of 16.5°C
 - Olson and Foster (1955) study reported a value of 16.1°C
 - Olson et al. (1970) did not report a threshold value, but yielded a temperature threshold for mortality similar to that found in the Olson and Foster (1955) report.

Supporting Science



- Segmented regression – a spline model.

“join point” – indicates threshold temperature at which mortality begins to increase.

- threshold value – 16°C

- 95% confidence interval ranging from initial daily maximum of 15.3°C to 16.6°C.

- An initial daily maximum of 15.3°C under a 0.2 °C daily rate of decline is equal to a Weekly Maximum Temperature (WMT) of 14.7 °C.

Addressing Comments on Proposal

- Geist et al. (2006) study – holding of adults prior to incubation study at 12 C. Adults experience higher pre-spawn environments.
 - EPA Region 10 Guidance – studies used in development of Guidance Document do not report the pre-spawn thermal history of adults.
 - Pre-spawn holding environment varied among the three most pertinent studies – yet resulted in similar conclusions regarding incubation survival.
- SSC should address adult migration.
 - Comments centered around adult migration timing, pre-spawn mortality, gamete viability, spawn timing
 - IPC is not proposing to change existing standards on the pre-spawn environment (20 C) – the proposal affects only the salmonid spawning period

Addressing Comments on Proposal

- Some contention that wild return estimates have not been proportional to overall run increase or credited only to Hatchery Supplementation
 - In 1991, 78 wild returns. In 2010 10,187 wild returns (25% of the run)
 - Estimates of wild : hatchery returns prior to 2010 are being re-evaluated.
(Run Reconstruction Team – 2011)
 - SR fall Chinook salmon support the most heavily fished listed ESU in the Columbia Basin – Harvest approaches 30-35%. States of Oregon and Idaho are holding fisheries on ad-clipped adults.
 - United States – refers to SR fall Chinook salmon as their “star” relative to recovery. *2009 NWF v. NMFS (FCRPS litigation)*

Addressing Comments on Proposal

- Why do SR Fall Chinook Salmon require less stringent criteria than other fall Chinook salmon?
 - 1) Idaho, Oregon and Federal law all encourage SSC temperature standards (recognizing species, stocks adaptations to varying environments).
 - 2) it is the scientific evidence that suggests that adoption of this SSC is protective of the site specific beneficial use that justifies the SSC process
 - 3) this criteria would be protective of Hanford Reach fall Chinook salmon – based on supporting literature
 - 4) Fall Chinook salmon are different from other races of Chinook salmon
- Climate Change – future climate change is not relevant to the question of what temperature is protective of the species below HCC (or anywhere) – It is only relevant to how often a standard is met.

NOAA-NMFS Review of Proposal

Aug 25, 2011

Bruce Suzumoto

“NMFS’ interest in this proceeding stems from our responsibility to protect and recover anadromous fish species listed under the Endangered Species Act (ESA). The Snake River downstream from Hells Canyon Dam supports the primary population of Snake River fall Chinook. NMFS does not believe that the proposed rule would negatively affect fall Chinook or their habitat for the following reasons:

- There is no direct evidence that the current water temperature regime, which does not meet the current IDEQ water temperature criteria, has negatively affected Snake River fall Chinook salmon. Since 2000 the population has grown substantially under the existing thermal regime.
- A comparison of current Hells Canyon and Hanford Reach spawning timing and temperatures indicates there is little difference between the reaches with regards to thermal conditions when fall Chinook are spawning. The Hanford Reach also supports a robust population of fall Chinook.”

Scientific Peer Reviews

The well-prepared and documented proposal is clearly based on the best scientific information available in the peer-reviewed, published literature as well as relevant agency documents. On the basis of this information, it is my conclusion that the proposed site-specific standard of a weekly average of maximum daily temperatures of 14.5°C between October 23 and 31 will be protective of egg incubation for the fall Chinook salmon population in the Hells Canyon reach.

Sincerely,



Charles C. Coutant, Ph.D.

When coupled with information specific to the Hells Canyon Reach of the Snake River, it is clear that IPC had compiled and reviewed all of what I would consider the major keystone pieces of information related to salmonid temperature requirements and that the amount of literature was more than sufficient for developing the proposed site specific criteria. Thus, my first conclusion related to the proposal is that the information and data assembled were appropriate and sufficient for developing the site specific criteria proposal.

... it is my opinion that the proposed SSC would be protective of fall Chinook salmon spawning, egg incubation, and fry emergence.



Dudley W. Reiser, Ph.D.
Senior Fish Scientist

Conclusions

The weight of evidence strongly supports a conclusion that IPC's proposed SSC of weekly maximum temperatures of 14.5 °C from Oct 23 and 13 °C from November 7 fully protects the most sensitive use - fall Chinook salmon spawning and incubation.

- SSC must be based on “scientifically defensible procedures” (IDAPA 58.01.02.275.01)
- Criteria must be based on “sound scientific rationale: 40 CFR 131.11